FY2008: Regional Integrated Ocean Observing System Development

NOAA continued a merit-based funding process in 2008 to enhance regional ocean observing systems and achieve three long-term outcomes: establishing coordinated regional observing and data management infrastructures, developing applications and products for regional stakeholders, and crafting regional and national data management and communications protocols. In addition, regional associations received planning grant awards designed to assist them in stakeholder engagement, education and outreach, and long-range planning activities.

SOUTHEAST ATLANTIC REGION

The Southeast Atlantic Region includes the coastal states from North Carolina to Florida. In 2008, implementation funds were provided to five recipients totaling $2,556,625. The 2008 Regional Association Planning Grant award to this region is $384,535.

Project Title:

Implementation of Regional Integrated Ocean Observing Systems: Support of RCOOS Development in SECOORA

Recipient/ Lead Principal Investigator:

S.C. Sea Grant Consortium, Dr. Rick DeVoe *(Rick.Devoe@scseagrant.org)*

Co-Principal Investigator:

University of North Carolina at Chapel Hill, Dr. Harvey E. Seim (*Harvey_seim@unc.edu*)

Cost:

Funded: FY 2008 (Year 1) - $400,000
Proposed (subject to available funds): Year 2 - $3,459,700; Year 3 - $3,476,595

Performance:

This project will consolidate Coastal Ocean Observing System (COOS) assets and products in the Carolinas with those in Georgia and Florida to establish a user-driven observing system that spans the entire SECOORA footprint. The foundation of the SECOORA RCOOS will build initially upon six primary elements included in this proposal: 1) Maintenance and development of existing observing assets and consolidation of existing sub-regional observing systems, 2) Construction of an integrated and embedded modeling system, 3) Development of ecosystems models targeted at predicting the characteristics of regionally important fish stocks, 4) Establishment of a data management system designed to disseminate rapid, high quality products, 5) Establishment of a systems engineering based structure to the observing system architecture that enables the seamless interoperability, and 6) Integration of an end-user community into the fabric of SECOORA to ensure responsiveness to regional needs.

Schedule:

1. Year 1
    - Maintain operations and data flow from four HF Radar sites

(over)

- Improve guidance and processes for data providers
- Complete the redesign of the SECOORA website that will allow for the incorporation of existing data streams and format them as prescribed by target user groups, and complete the development of basic tailored interfaces that support specific communities of interest

2. Years 1-3
    - Work with membership of SECOORA and its Stakeholders Advisory Council to prioritize elements of RCOOS growth

3. Year 2
    - Establish accuracies of observed and simulated data (skill assessment) for all available physical components through appropriate comparisons and intercomparisons
    - Implement locally-relevant ecosystem models that will quantify the role of abiotic and biotic effects on the growth, survival, and recruitment of target species in the region
    - Assess current operational processes

4. Years 2-3
    - Sustain and enhance observing assets in the SECOORA domain, including buoys, offshore towers and coastal stations
    - Maintain HF Radar measurement systems and provide data in near-real time
    - Sustain and enhance nowcast/forecast modeling systems
    - Evaluate an existing regional-scale model for the SECOORA domain
    - Coordinate with the U.S. Coast Guard (USCG) and MACOORA to enable surface current field input to the USCG Search and Rescue Operations application
    - Establish best current form of open boundary conditions and coupling of wave, atmospheric, and circulation models
    - Enhance/refine tailored interfaces to include aggregated near-real-time delayed mode, and model output data that supports the thematic priorities of fisheries/ecosystem management, waves, and search and rescue
    - Develop, test, and deploy a range of applications
    - Integrate national DMAC advances with SECOORA data management activities and ensure interoperability with other SE COOS efforts
    - Enable access to archival information
    - Ensure ecosystem and fisheries modeling efforts are coordinated with the stakeholder groups they are serving
    - Ensure circulation modeling efforts are coordinated with USCG, the Gulf Coast Ocean Observing System, and the Mid-Atlantic Coastal Ocean Observing Regional Association
    - Regularly meet with other Regional Associations to share lessons learned and outreach initiatives
    - Develop standards-based curriculum based on fisheries/ecosystem management, waves, coastal hazards, and search and rescue activities

5. Year 3
    - Evaluate existing linked Ecosystem Modeling with Circulation Modeling efforts at ecologically relevant space and time scales to characterize the transport of target species from offshore spawning locations to nursery areas

- Develop nowcasting capabilities of oceanographic and ecosystem properties to provide relevant information for use in the South-East Data, Assessment, and Review (SEDAR) recruitment forecast process
- Define desired future state of the RCOOS, identify gaps and cost/schedule drivers
- Develop methodologies for the RA design and implementation that maximizes use of existing assets and interoperability, and ensures cost-effectiveness and long-term sustainability

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Project Title:

Integration of Coastal Observations and Assets in the Carolinas in Support of Regional Coastal Ocean Observation System Development in the Southeast Atlantic

Recipient/ Lead Principal Investigator:

University of North Carolina Wilmington/ Dr. Lynn Leonard (*lynnl@uncw.edu*)

Cost:

Funded: FY 2007 (Year 1) - $1,200,000
FY 2008 (Year 2) - $1,200,000
Proposed (subject to available funds): Year 3 - $3,001,575

Performance:

This project will focus on the integration of existing assets and observations specific to the development of wave, water quality, and public health safety products in the Carolinas coastal region. Investigators will support and use a subset of existing platforms currently operated by academic and federal entities and eventually install two new wind, wave and current monitoring stations in the North Carolina Pamlico and Albemarle Sounds and two additional coastal wave stations off the outer banks. Initially, the work will focus on core variables and observations needed to support weather and rip current forecasting as well as US Army Corps of Engineers process modeling. Investigators will use existing environmental data and adapt selected NOAA National Estuarine Research Reserves non-real time stations to real-time in support of environmental modeling applications and development of estuarine water quality standards. Since most of the data collection infrastructure is in place, this project is immediately executable and creates a test bed to evaluate observing system design criteria, such as the ability of a system to directly support specific user-driven application needs, as put forth by the Southeast Coastal Ocean Observing Regional Association.

Schedule:

1. Years 1-3
   - Maintain inner-shelf and nearshore monitoring stations in North and South Carolina coastal waters
   - Provide operational data streams for existing USACE stations
   - Develop prototype Surf Conditions Nowcasting System (SCNS)

2. Year 2
   - Develop prototype validations module linkage to Regional Coastal Ocean Observing System (RCOOS) archive
   - Develop prototype interface with the USACE Model Evaluation and diagnostics System (MEDS)

- Migrate website components to appropriate (e.g.SECOORA) platform

3. Years 2-3
   - Upgrade NERR stations in North and South Carolina to real time
   - Build a comprehensive database including archived data from previous NOAA COTS programs in the Carolinas, USACE, and various water quality programs
   - Optimize and ensure access to near-real-time, delayed mode, and model output data via web browser
   - Develop rigorous procedures for assessment of real-time data and relay information to users
   - Integrate standards and processes with other SECOORA data management activities
   - Assess system function
   - Conduct public outreach and stakeholder engagement for both the Carolinas RCOOS and SECOORA

4. Year 3
   - Assess, assimilate and disseminate water quality information in North and South Carolina
   - Upgrade systems that have surpassed expected lifecycle
   - Demonstrate RCOOS-wide wave/current validation
   - Deliver semi-operational RCOOS-wide validation module
   - Evaluate Simulated WAve NearShore (SWAN) model as an approach to forecast wave conditions in Long Bay
   - Document procedures for real-time data assessment and relay information to users
   - Verify model improvement
   - Develop standards-based visualization tools for SECOORA

Project Title:

A Regional Storm Surge and Inundation Model Test Bed for the Southeast Coastal Ocean Observing System Regional Association

Recipient/ Lead Principal Investigator:

University of Florida/ Dr. Peter Sheng (*pete@coastal.ufl.edu*)

Cost:

Funded: FY 2007 (Year 1) - $500,000
FY 2008 (Year 2) - $372,200
Proposed (subject to available funds): Year 3 - $500,000

Performance:

Using a community-based approach and working with the National Weather Service, Federal Emergency Management Agency and state and county departments of Emergency Management, this project will conduct a comprehensive validation and comparative study of four leading storm surge and inundation models developed by the academic community. The goals of this project are to enhance the storm surge and inundation modeling capabilities, establish common standards for storm surge and inundation modeling, bridge the gap between the leading academic storm surge modelers

and the operational agencies, and potentially improve maps of inundation, e.g. the SLOSH surge atlas and Flood Insurance Rate Maps (FIRMs), for enhanced emergency planning and management.

Schedule:

1. Year 1
    - Establish a panel of experts and users from to produce a set of objective protocols and criteria for model-data and model-model comparisons
    - Produce an updated inventory of storm surge, wave, and inundation modeling activities
    - Identify the major products (e.g., SLOSH surge atlas, FIRMs, and inundation maps) produced by NWS and FEMA and used by Emergency Managers and determine possible enhancements.
    - Develop a common data framework, and design realistic test problems with archived field and analytic data, for model-data comparison and inter-comparison of storm surge and inundation models while leveraging current advances in DMAC and Marine Metadata Interoperability (MMI)
    - Develop a set of common model quality and performance standards for all surge, wave, and inundation models to be used in the region
    - Select past hurricanes for model validation and inter-comparison, gather and store data in a Storm Archive, as part of a virtual computing "Grid" that will leverage and build upon a Virtual Grid

2. Year 2
    - Conduct simulations of selected hurricanes
    - Compare model results to data and with each other in terms of a number of model variables and skill assessment methods and to determine if these models meet existing federal standards
    - Determine the sensitivity of models' skills to model attributes, coefficients, and input data
    - Using the four storm surge models and the Sea, Lake and Overland Surges from Hurricanes (SLOSH) model, produce and compare a surge atlas for a coastal region, following the method used to produce SLOSH surge atlas
    - Determine the sensitivity of a surge atlas to various model attributes and input data and improve the storm surge and inundation models if necessary
    - Working with NWS and Emergency Managers, recommend ways to potentially enhance the SLOSH surge atlas or produce ensemble surge atlas

3. Years 2-3
    - Maintain and enhance Virtual Grid

4. Year 3
    - Conduct ensemble model runs for a coastal region in FL and NC, following the FEMA method for producing FIRMs for a 100-yr storm
    - Provide the results from the four storm surge models to FEMA and produce FIRMs for inter-comparison and comparison with the FEMA FIRM
    - Identify the sensitivity of FIRMs to various model features and input data.
    - Working with FEMA, identify ways to enhance their FIRMs

- Using the four models, produce real-time inundation maps for a coastal region during a hurricane, and compare them with the corresponding SLOSH surge atlas
- Using the model comparison results, develop "best practice" guidelines for optimal application of storm surge models

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Project Title:

A Prototype Operational Modeling System for Waves, Coastal Currents, Inundation and Hydrologic Flooding for Eastern North Carolina

Recipient/ Lead Principal Investigator:

University of North Carolina at Chapel Hill/ Dr. Rick Luettich (*rick_luettich@unc.edu*)

Cost:

Funded: FY 2007 (Year 1) - $499,991
FY 2008 (Year 2) - $371,950
Proposed (subject to available funds): Year 3 - $499,924

Performance:

This project will develop a modular, integrated modeling system that provides 24/7/365 forecasts of waves, storm surge, inundation, coastal circulation, and hydrologic runoff for Eastern North Carolina, a region highly susceptible to catastrophic impacts of severe coastal weather. Resultant data and products will be developed using ensemble-based procedures and routinely evaluated against extensive existing in-situ observations. The overall goal is to demonstrate the relevance to regional stakeholders of an operational watershed-to-coastal ocean modeling system that provides information on offshore and nearshore wave conditions, information to assess rip current threats, regional wave and current conditions in high traffic areas such as tidal inlets, nearshore currents for search and rescue operations, and inundation data associated with coastal storm surge and hydrologic runoff. Information will be transmitted in compatible formats to three regional National Weather Service Forecast Offices the to the U.S. Coast Guard (USCG) to be applied during moderate conditions and severe storms for use in marine forecasts, search and rescue operations, decision-making by emergency managers, and the U.S. Army Corps of Engineers for evaluating near shore sediment transport budgets.

Schedule:

1. Year 1
   - Develop and refine model domains and associated databases
   - Implement quasi-operational, 24/7/365 high-resolution coupled wave-current model and develop data streams to distribute output to WFOs and to USCG
   - Ingest regional IOOS observational data streams and develop skill assessment scheme
   - Evaluate strategies for establishing boundary conditions at the dynamic interface between the hydrologic and coastal models; determine the type and spatial/temporal frequency of shared information
   - Develop initial project web site

2. Years 1-3
    - Conduct annual survey/workshop with users to document and discuss feedback on product value and provide tech transfer

3. Year 2
    - Develop storm suite to be used for ensemble modeling of tropical cyclones
    - Implement methodology to blend 24/7/365 model runs with event-based tropical cyclone ensemble forcing
    - Evaluate model skill including development of methodology for directional wave spectra.
    - Implement initial coupling of hydrologic and coastal models in quasi-operational job stream

3. Year 3:
    - Expand web site based on user feedback and to provide OPeNDAP based data products
    - Pursue distribution of data to alternate partners
    - Evaluate and pursue coupled system enhancements based on user feedback
    - Validate coupled modeling system against historical data (e.g., Hurricane Floyd)
    - Continue evaluation of system wide model skill
    - Develop classroom education material

Project Title:

Expansion of the Carolinas Coast Marine Weather Template within the SECOORA Region

Recipient/ Lead Principal Investigator:

University of North Carolina at Wilmington/ Jennifer Dorton (*dortonj@uncw.edu*)

Cost:

Funded: FY 2007 (Year 1) - $294,504
FY 2008 (Year 2) – $212,475

Performance:

Investigators will work with NOAA's National Weather Service (NWS) – Southern Region Headquarters and Weather Forecast Offices (WFOs) to expand the NWS's experimental Carolinas Coast marine portal (*www.weather.gov/carolinascoast*) into Florida, thereby creating a standardized Southeast Marine Weather Portal that covers the entire Southeast Coastal Ocean Observing Regional Association (SECOORA) domain. The goals of this proposal are to provide 24/7 access to critical marine information for the commercial and recreational marine communities within the SECOORA region; and, to support the transfer of the developed information technology product to WFOs with marine forecasting responsibilities. Primary objectives are: 1) expand the Carolinas Coast template into Florida; 2) provide data management capabilities to ensure 24/7 marine weather portal accessibility; 3) develop appropriate documentation and provide workshops to ensure the transfer of the marine weather portal over to the NWS; and, 4) provide outreach within the SECOORA region to inform the NWS-WFO constituents and other identified marine organizations and individuals about the improved NWS marine weather information portal.

Schedule:

1. Year 1
    - Support existing Carolinas Coast web pages and data flow
    - Expand Carolinas Coast marine weather template throughout Georgia and Florida and rename as the Southeast Marine Weather Portal (SMWP)
    - Develop hardware, software, and communications redundancy as part of the data management protocol to ensure 24/7 access (University of South Carolina and University of South Florida will each install and maintain synchronized application and database servers)

2. Years 1-2
    - Support database and product development, database architecture, and data sharing standards and protocols

3. Year 2
    - Ingest data from providers currently contributing data to the National Data Buoy Center
    - Implement documentation and training workshops for National Weather Service (NWS) Office of the Chief Information Officer personnel
    - Complete the system architecture, database management, and web interface for SMWP
    - Outreach efforts targeting marine communities in North Carolina, South Carolina, Georgia, and Florida

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NOAA Contacts:

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